AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Cancelled)

2. (Currently Amended) A method for computing an approximation of a vector, comprising:

storing a first approximation of the vector in a quantum computer register; and

appending a qubit to the quantum computer register that stores the first approximation of the vector.

3. (Original) The method as recited in Claim 2, further comprising:

performing a Hadamard transformation on the appended qubit.

4. (Cancelled)

5. (Currently Amended) A method for preparing a state of a quantum computer, comprising:

~~The method as recited in Claim 4, wherein said preparation further includes:~~

storing a vector in a quantum computer register; ~~and~~

appending at least two qubits to the vector in a quantum computer register; and

performing a Hadamard transformation on the appended at least two qubits.

6. (Original) The method as recited in Claim 5, wherein:

at least two of the appended qubits are in the state |0>.

7. (Cancelled)

8. (Currently Amended) A method for efficiently preparing the initial state of a quantum computer ~~required by the quantum method for eigenvalue approximation of Abrams and Lloyd~~, said method comprising ~~the steps of~~:

storing a first eigenvector approximation in a quantum computer register;

appending at least two qubits in the state |0> to the first eigenvector approximation; and

performing a Hadamard transformation on the appended qubits.

9. (Currently Amended) A method for efficiently preparing ~~an initial~~ state of a quantum computer for ~~eigenvalue~~ eigenvector approximation, comprising:

obtaining a first eigenvector;

placing the eigenvector in a quantum computer register;

appending at least two qubits to the eigenvector in the quantum computer register; and

performing a Hadamard transformation on each of the at least two qubits.

10. (Original) The method as recited in Claim 9, wherein the at least two qubits are in the state |0>.

11. (Original) The method as recited in Claim 10, wherein said first eigenvector approximation is obtained for an eigenproblem discretized on a coarse grid.

12. (Cancelled)

13. (Currently Amended) A method for approximating an eigenvalue of an eigenproblem with a quantum computer, comprising:

obtaining a first eigenvector from a course discretization of the eigenproblem;

storing the first eigenvector in a quantum register of size log No qubits;

appending at least two qubits in a second quantum register to the first eigenvector, wherein the at least two qubits are in the state |0>; and

performing a Hadamard transformation on each of the at least two qubits to derive a second eigenvector~~; and~~

~~using the second eigenvector in the Abrams and Lloyd quantum method~~.

14. (Original) The method as recited in Claim 13, wherein the first eigenvector is obtained classically.

15. (Currently Amended) A quantum computing system for computing an eigenvalue, comprising:

means for storing a first eigenvector in a quantum register;

means for appending at least two qubits to the first eigenvector in the quantum register; and

means for performing a Hadamard transformation on each of the at least two appended qubits to produce a second eigenvector;

means for computing the eigenvalue from the second eigenvector.

16. (Original) A quantum computing system as recited in Claim 15, wherein said additional qubits are appended while in a predetermined state.

17. (Original) A quantum computing system as recited in Claim 16, wherein the predetermined state is the state $|0\rangle$.

18. (Original) A quantum computing system, comprising:

a first quantum register with size of at least $\log N_0$ qubits, able to store an eigenvector;

means for appending at least two qubits in a second quantum register, each of the at least two qubits in the state $|0\rangle$, to the eigenvector; and

means for performing a Hadamard transformation on each of the at least two qubits.

19. (Original) The quantum computing system as recited in Claim 18, wherein:

the eigenvector is derived from an eigenproblem discretized on a coarse grid.

20. (Cancelled)